Certain claims have been amended to more distinctly claim the subject matter of the Applicants' claimed invention. In addition, new claims have been added to the application and the Specification has been amended. These amendments are not offered to distinguish over the cited reference or other prior art. No new matter is being entered in the application.

The Applicants describe and claim a technique for establishing membership of a node in a network cluster. Instead of requiring a quorum of nodes, the Applicants determine cluster membership based on a node's ability to access a shareable storage device. In particular, disk-based messaging is used to establish cluster membership.

In comparison, Wipfel only allows access to shareable storage to nodes that are deemed members of the cluster. That is, membership must be established before a node can access the shared storage. That approach is contrary to the Applicants' claimed invention.

As explicitly recited in Claims 1 and 5, the claimed invention requires "granting membership in a network cluster to a node if the node has access to the shareable storage device." Similarly, Claim 4 recites "a manager mechanism to grant membership in the network cluster to the node based on the node having access to the storage device." These explicit limitations are not taught or suggested by Wipfel.

Referring to column 8, lines 41-59, of Wipfel, a member node must be known to all other member nodes, so that it can be monitored. It is then given access to shared disks. A node is removed from the cluster "when it can no longer be reached through the network." (Wipfel, col. 8, ll. 46-47.) Thus, Wipfel uses active monitoring to track member nodes and controls access to shared disks accordingly. That is contrary to the Applicants' claimed invention, which bases member nodes on their ability to actually access the shared disks.
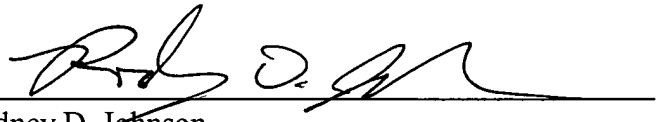
As such, Wipfel does not teach or suggest the claimed invention. Furthermore, Wipfel teaches away from the claimed invention by removing nodes from cluster membership, even if those nodes can actually access the shared disk .

Reconsideration of the rejections under 35 U.S.C. § 102(e) is respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims (Claims 1-21) are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned attorney at (978) 341-0036.

Respectfully submitted,
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Dated: March 6, 2002

MARKED UP VERSION OF AMENDMENTS

Specification Amendments Under 37 C.F.R. § 1.121(b)(1)(iii)

Replace the paragraph at page 1, lines 5 through 16 with the below paragraph marked up by way of bracketing and underlining to show the changes relative to the previous version of the paragraph.

Serial No. [_____] 09/321,998, filed May 28, 1999, entitled AVOIDING N-SQUARED HEARTBEAT MESSAGING PROBLEM IN AN OPERATING CLUSTER VIA CLOSED LOOP MESSAGING THEME, by Richard Frank, Michael Cusson, Joydip Kundu, and Daniel E. O'Shaughnessy, inventors;

Serial No. [_____] 09/322,472, filed May 28, 1999, entitled USING A CLUSTER-WIDE SHARED REPOSITORY TO PROVIDE THE LATEST CONSISTENT DEFINITION OF THE CLUSTER (AVOIDING THE PARTITION-IN-TIME PROBLEM), by Joydip Kundu, Richard Frank, Michael Cusson and Daniel E. O'Shaughnessy, inventors; and

Serial No. [_____] 09/321,967, filed May 28, 1999, entitled PROVIDING FIGURE OF MERIT VOTE FROM APPLICATION EXECUTING ON A PARTITIONED CLUSTER, by Richard Frank, Michael Cusson, Joydip Kundu, and Daniel E. O'Shaughnessy, inventors.

Replace the paragraph at page 10, lines 4 through 9 with the below paragraph marked up by way of bracketing and underlining to show the changes relative to the previous version of the paragraph.

As described above in conjunction with FIG. 2, the cluster manager 32, in concert with the cluster managers residing on [nodes_ 2 - 4] nodes_2 - node_4 14, 16, 18, manages cluster connectivity within the quorumless cluster 10. For the cluster managers to effectively cooperate in the connectivity management endeavor, a facility for sharing data is provided. The shareable storage device 22 of FIG. 1 houses a repository for this data sharing facility.

Replace the paragraph at page 21, lines 3 through 22 with the below paragraph marked up by way of bracketing and underlining to show the changes relative to the previous version of the paragraph.

A quorumless network cluster [is described which] provides a highly available system by addressing the partition-in-space and partition-in-time problems in network clusters.

[This solution provides a] In a particular solution, a cluster manager (CM) [which uses] can use disk based messaging to manage the operation of the cluster. Each node within the cluster must have access to a shared disk to operate within the cluster. [In the case of a partition-in-space problem, where a subset of nodes maintains full network connectivity among the nodes within the set but has no connectivity between the sets, the CM queries an application, operating on the cluster, to provide input to the CM to select which subset of nodes will survive as the cluster.]

[Also described is a] A particular methodology [for operating] can operate the cluster in a closed loop between nodes 1 to N. [Each node sends a single heartbeat message to the node ahead of it in the loop and receives a single heartbeat message from the node behind it in the loop.] If a node fails to receive a heartbeat message from its predecessor in the loop, it initiates a cluster reconfiguration by sending a reconfiguration message to each other node in the cluster.

The quorumless cluster [also provides] can also include a common storage for a cluster definition. [A single node is designated as the coordinator node of the cluster.] Each node may provide a proposed change to the cluster definition, however only [the] a single coordinator node may update the cluster definition and apply the suggested changes.]

Claim Amendments Under 37 C.F.R. § 1.121(c)(1)(ii)

1.   (Amended) A method for managing membership of nodes in a computer network cluster, the method comprising:

[interfacing] defining a shareable storage device to store data for a network [cluster]; and

granting membership in [the] a network cluster to a node if the node has access to the shareable storage device.

OID-1999-35-03   -ii-

2. (Amended) The method of Claim 1 further comprising:

revoking membership of the node in the [computer] network cluster if the node ceases to have access to the shareable storage device.

3. (Amended) The method of Claim 2 further comprising:

ceasing operation of the <u>network</u> cluster if no node has access to the shareable storage device.

4. (Amended) A system for managing membership of nodes in a computer network cluster, comprising:

a network infrastructure for supporting a plurality of nodes in a [computer] network <u>cluster</u>;

a storage device separated from the network infrastructure and interconnectable to a plurality of nodes;

a node interconnected with the storage device; and

a manager mechanism to grant membership in the network cluster to the node based on the node having access to the storage device.

5. (Amended) A computer program product for managing membership of nodes in a computer network cluster, the computer program product comprising a computer usable medium having computer readable code thereon, including program code [which] <u>that</u>:

[interfaces] <u>defines</u> a shareable storage device to <u>store data for</u> a network cluster; and

grants membership in the network cluster to a node if the node has access to the shareable storage device.